

ASPHALT CONCRETE PAVEMENT WITH CONCRETE SUBBASE WITH THE ENRICHED QUARRY LIMESTONE WASTE AS A COARSE AGGREGATE

It is well known that that initial cost of rigid concrete pavement is higher than that of flexural asphalt pavement on average by 20%, whereas maintenance cost of flexural pavement considerably (in times) higher than that of rigid pavement. Though total cost of rigid pavement is less than that of flexural pavements asphalt pavements prevail in the US road construction; the choice of State Departments of Transportation is determined usually by the current budget. The aim of this invention is pavement combining the initial cost close to that of flexural pavement and maintenance cost close to that of rigid pavement.

Asphalt concrete pavement comprising an asphalt surface course, a concrete subbase, and a layer of granular material between surface course and concrete subbase can be considered as a semi-rigid pavement. Rigidity of this composite structure is provided by concrete subbase whereas its flexibility is provided by asphalt surface course resting on the layer of granular material. Cracking of asphalt surface course is caused mainly by fatigue stresses. Limitation of deformations of asphalt surface course within desirable level and corresponding reduction of fatigue stresses means reduction of probability of cracking of this course. It can be achieved by the choice of quality and thickness of the layer of granular material resting on the concrete subbase. This task is in the format of the current road design practice; 90% of US roads pavements are asphalt pavements.

The novelty of invention is concrete subbase of specified compressive strength f_c' and modulus of rupture (MR) up to 5,000 and more than 750 psi, respectively. This is very cheap concrete; its coarse aggregate is processed small grains by-product of manufacture of crushed limestone of regular sizes.

Portland Cement Association Engineering Bulletin EB 109 constitutes methods of design of composite concrete pavement with lean concrete subbase of modulus of rupture in the range from 150 to 450 psi. Design procedure of the normal concrete pavement results in the certain value of normal concrete thickness. The sense of composite concrete pavement of the identical capacity is in the reduction of consumption of normal concrete with high cost crushed granite as a coarse aggregate by replacing of a part of this concrete by subbase or lower layer cheaper concrete. As applied to such composite structural member as asphalt pavement as asphalt pavement with concrete subbase it means the possibility of replacing of part of asphalt by cheap and very efficient in terms of flexural strength concrete of subbase of modulus of rupture up 750psi and more. Efficiency of increase of concrete strength of subbase of composite pavement is considered mainly in the prior art.

The replacement of part of asphalt by concrete means corresponding reduction of expenditure of such petrol product as bitumen. Bitumen is by-product of refining of oil but this by-product can be processed to the high quality product. Reduction expenditure of bitumen can allow reduction of import of oil. Production of cement for concrete also required expenditure of energy resources. However US production of cement is based mainly on the use of American coal as a fuel.

However the main advantage of semi-rigid pavement is reduction of repair road work as compared with that of flexural pavement. It means more regular road movements with the corresponding reduction of expenditure of motor fuel. Moreover maintainability of semi-rigid pavement with asphalt surface course is better than that of rigid pavement.

All cited works can not be related to item of invention.